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Infant Nutrition

What is 'successful feeding' on the neonatal intensive care unit? A psychologist's perspective

Nadja Reissland, Sue Lewis, Mithilesh Lal, Lynne Patterson

ORIGINAL

This paper discusses studies of feeding preterm infants on the neonatal intensive care unit (NICU) with a view to defining 'success in feeding'. The term 'successful feeding' is used regularly but without any universal consensus of specific parameters entailing success. The current paper contributes to the debate of the psychological impact of feeding on the NICU in relation to parent, nurse and infant feeding interaction, centring on infant behavioural development in the context of feeding. We analyse the published literature covering a wide range of methodological approaches including randomised controlled trials and observational studies. Four key themes are identified in terms of what contributes to success in feeding: infant developmental maturity, mother-infant feeding interactions, nursing interventions, and comparison of parental and health care professionals' engagement during infant feeding practice. We conclude that the emphasis of the meaning of successful feeding has changed from a mainly medical focus to include a psychological perspective.



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Introduction

Feeding is arguably the most important aspect of care for infants admitted to the NICU (Silberstein *et al* 2009). It is clear that premature infants need nutritional support to survive (Jones 2012), but successful feeding cannot be considered as relating to nutritional intake alone. Infant development also requires effective behavioural management of feeding support that takes account of various agents involved in the infant's care including the premature infant, his/her parents, and health professionals, with their perceptions and concerns. However, it is still unclear what full and optimal feeding support in the NICU should consist of and, importantly, how and by whom it should be delivered. Currently, there is no apparent agreement on which indicators might need to be used to evaluate feeding support (Kuzma-O'Reilly *et al* 2003, Pridham *et al* 2007, White-Traut & Norr 2009), and therefore which factors need to be included in a definition of 'successful feeding' for preterm infants in NICUs. It is our contention that the concept of successful feeding, if clearly defined, might provide a universal consensus for NICU care that would be meaningful both to health care professionals and parents. As an initial step in this process, this paper takes a broadly psychological perspective on this issue, with a view to revealing key non-nutritional indicators that might need to be considered in reaching a consensual definition of 'successful feeding'.

Why 'successful feeding'?

Although 'successful feeding' is not a term currently in regular use in the academic literature, it is increasingly used on popular websites as well as in professional and training symposia. As parents are encouraged to take an active role in the care of their infant the NICU,* we suggest that the definition of a concept, using non-clinical terminology meaningful to parents, yet also grounded in professional consensus on its evidence-based definition, may help health professionals to support families and achieve integrated provision of care.

Feeding and behavioural organisation

The ability to feed is rooted in the premature infant's maturity. Cues to mature organisation include pre-feeding movements such as opening the mouth to receive breast or bottle (Reissland *et al* 2012). Preterm infants require significant support to achieve this level of behavioural skill or maturity (Ross & Browne 2002). Nutritional rather than behavioural or psychological needs have typically been prioritised in the NICU but, with recent advances in medical research and more infants being able to survive at

ever earlier gestational ages, behavioural support is being re-prioritised. With the increased stress this places on all concerned, feeding interactions between the infant, his or her parents and health care professionals have become an important topic, not only for basic survival but also for establishing a long-term healthy relationship with food and feeding.

The emphasis placed on basic nutritional needs over a more ecological approach to feeding has tended to place responsibility in the hands of nursing staff. This focus on medical needs rather than psychological needs according to Altimier & Phillips (2013:18) 'is no longer acceptable'. In a study conducted by Minde *et al* (1980), more than 30 years ago observations of maternal visits to the premature nursery which were followed up with observations of feeding interactions during the infants first three months at home, showed consistent behaviours toward these infants. This suggests that very early interactions might have an influence on later mother-infant engagement, placing great importance on ensuring that parents have an active role in achieving mature engagement and feeding success in the NICU. Despite some work in this area (White-Traut & Norr 2009), the challenges which premature infants, their parents and clinical staff face during the transition from feeding by nasogastric tube to proficient oral feeding remain contextually, conceptually and empirically under-examined.

In sum, apart from medical aspects of feeding, including the nutritional composition of feeds and method of delivery, research which is infant-centred with an emphasis on socio-psychological aspects of the feeding interaction on NICUs is missing. There is some recognition of the importance of parents in the lives of preterm infants from birth (Miles & Holditch-Davis 1997), and some current work examines emotional and psychological needs of parents during the period when their infant is hospitalised in a NICU pointing to the impact of this experience on their subsequent parenting skills. Hence, this review concentrates on studies conducted on NICUs, and is concerned with the psychology of feeding interactions and outcome measures, rather than the medical aspect of feeding in terms of types and timing of food given during the course of premature infants' development on the NICU. Specifically, this discussion paper concentrates on studies which examine feeding-related interactions with premature infants who are at the stage of tube or cup feeding and progressing to bottle or breastfeeding.

To summarise, currently there is no consensual definition of what constitutes 'successful' feeding interactions on the NICU. Furthermore, studies

examining mother-infant interaction on the NICU often fail to take into account that mothers differ in the way they interact with their infants in hospital depending on the situation in which they are observed. This was demonstrated in one study in which maternal interactions were compared while feeding, changing nappies and playing with their term or preterm infants in hospital. The results showed that the way mothers spoke to their premature compared with term infants, both on the NICU and two months later at home, differed not only in the complexity and types of speech used to preterm and term infants but also in which situation maternal speech was recorded (Reissland *et al* 1999). This study demonstrates that maternal behaviour has to be judged relative to the situation in which she is observed. Additionally, Miles & Frauman (1993) suggested that mothers having to negotiate their caregiving roles with nurses on the NICU added to the stress of the NICU environment. Although, both mothers and nurses express concern for the well-being of the infant, a related sense of responsibility, and overlapping roles, mothers find themselves unequal partners in their roles and must learn strategies to negotiate these roles successfully. Given that feeding interactions involve both parent and nurse with the infant at the centre of that interaction, the focus of this paper concerns what is known about this interaction in order to develop a working definition of successful feeding.

Infant maturity

One important aspect of successful feeding depends on the maturity of the infant. Holditch-Davis *et al* (1999) observed for one to two hours 56 medically fragile infants on the NICU in ten second intervals. Observations included maternal engagement with their infants, maternal caregiving activities, behaviours such as feeding and playing with the infant, as well as infant sleep-wake states and infant behaviours. The infants were followed up one month after hospital discharge, and at six months corrected age, in order to assess the effect of neurological problems and developmental delays on maternal behaviour. The researchers observed whether or not mothers were engaged in caregiving behaviours including feeding, infant sleep-wake states and infant behaviours. They found that mothers would engage differently with infants who had more medical treatments compared to relatively healthy infants. Mothers of those babies, who on the NICU had the most medical interventions, spent relatively more time feeding their babies on the NICU compared to other activities such as playing, holding, rocking or moving the infant. Hence, maternal engagement with the infant on the NICU in general occurred mostly during feeding but was dependent on the infant's health status. These results point to the importance

of maternal feeding interactions with the infant during the stay on the NICU. Feeding engagement will be different for mothers who breastfeed, where the mother takes on an exclusive role compared to mothers who feed breast/milk via cup or bottle. Hence, breastfeeding might improve mother-infant engagement on the NICU. There is some research indicating that even medically fragile infants can learn to breastfeed successfully. Nyqvist (2008), in a descriptive study, observed 15 infants, aged 26 to 31 weeks at birth, in terms of the oral motor capacity of these infants to breastfeed. They found that by 29 weeks' postmenstrual age infants start to root on the breast and full breastfeeding was attained at a median of 35 weeks and hence argued that breastfeeding should be supported even with very premature infants on the NICU.

Mother-infant feeding interactions on the NICU

Maternal feeding engagement on the NICU mostly focusses on the maternal experience of breastfeeding (Pineda 2011). However, not all mothers are comfortable with breastfeeding. A number of qualitative studies investigate maternal reports on their experience of breastfeeding very low birth weight infants. Lee *et al* (2009) found that mothers blamed themselves and felt that they had to breastfeed in order to give their infants the best start in life. A study by the Canadian Paediatric Society Nutrition Committee (1995) compared feeding maternal milk with various other milk foods and concluded that the advantage of feeding premature infants maternal milk has both clinical (anti-infective) benefits to the baby and psychological benefits to the mother. Nyquist (2005) argued that breastfeeding in the NICU is facilitated by a general positive attitude to breastfeeding in society as well as the knowledge of professionals about preterm infants' ability to breastfeed. However, mothers unable to breastfeed should not be blamed but supported in other ways to engage with their infants. Some studies argue not only breastfeeding, but feeding or caring for the baby in general, improves parent-infant attachment and moderates the psychological stress of the parent (Miles *et al* 1993, Singer *et al* 1999).

The importance of the parenting role, specifically the alteration in the parenting role while the infant is hospitalised (Griffin *et al* 1998) is a major contributor to infant well-being. In order to alleviate this major stressor, Just (2005) argued that feeding and other activities should be encouraged in the NICU between mothers and their premature infants. Additionally, not only does the interaction between mother and infant affect the development of the parent-infant relationship, it also influences the parent's ability to care for the infant, and if the social aspect of the relationship is missing then this may even lead to cognitive and emotional delays in infant development.

*England's Department of Health published a Toolkit for high-quality neonatal services in 2009. Included in a list of services necessary to high quality, integrated neonatal care (DH 2009:19) was 'psychological support for mothers and families'. The same level of service should be provided in the NICU. Notably, UK NICE (National Institute for Health and Care Excellence) guidelines for preterm labour and birth published Nov 2015 <http://guidance.nice.org.uk/CG/Wave0/660> [Accessed 30 March 2016] do refer to the need for maternal psychological care.

This argument is supported by Zahr (1991) who found that maternal lack of involvement in their infant's care was perceived as a major source of stress and lead to lowered confidence in parenting abilities. This was also the observation of Miles *et al* (1992) and Hayes *et al* (1993) who argued that the length and type of contact with the infant on the NICU was often restricted and consequently mothers perceived themselves as inadequate caregivers because they felt unable to provide for even the most basic needs, such as feeding or holding their sick infant.

Nursing intervention to help mothers on the NICU

The importance of maternal involvement in feeding her infant was supported by studies conducted by Fenwick *et al* (2001) and Lupton & Fenwick (2001). Fenwick *et al* (2001) interviewed 28 Australian mothers about their experience in the NICU. Their analysis revealed a three-way interaction on the NICU. The relationship mothers had with nurses influenced how these women perceived their connection to their infants and their confidence in caring for their infant. The importance of the nurse in maternal perception of her role in the care of their infants was emphasised in a further study by Lupton & Fenwick (2001), which concluded that parents felt that 'their infant belonged to the nurse'. They argued that it was the nurses' responsibility to involve parents in feeding and other caregiving activities.

Wheeler *et al* (1999) researched nursing interventions which would help to promote breastfeeding, which puts the mother at the centre of the feeding interaction on the NICU. Their observational study recorded daily maternal feeding of 41 premature infants aged 32 weeks or older until discharge. They concluded that neonatal nurses play a vital role in breastfeeding outcomes and that awareness of this fact has to be transmitted to the nurses. This was also the conclusion reached by Flacking *et al* (2007), who interviewed mothers by telephone after discharge and found that parents complained about lack of breastfeeding advice as well as dissatisfaction with nurse behaviour towards the parents and a conflict about parental roles on the NICU. Moran *et al* (1999) in an observational case study of a 32-week-old infant also found that the nurses played an essential role in supporting the mother's care and ability to breastfeed. Alderson (2006) argued that although English law requires parental consent before any touching of the infant takes place, it is generally assumed that before parents can start caring for their baby, including feeding the baby, they need to ask nurses for permission to touch their own infants. Alderson (2006) suggested that although neonatal feeding involves anxiety and risk, more overt sharing of information and decisions about options could be to the advantage of nurses, parents and babies.

Comparison of parental and nurses' role on the NICU during feeding

Mothers and nurses assume different roles when feeding premature infants on the NICU. Miller & Holditch-Davis (1992), observed 29 high-risk premature infants for two minutes during parental and nursing care, including feeding and changing. Their results indicated that nurses and parents provided different types of stimulation with nurses showing more procedural care and parents being more likely to move, talk or touch the infant affectionately. Infants reacted differently to touch by mother and nurse, showing more jitters or large movements with nurses and more smiles and active sleep with parents. However, these differences did not translate into feeding responses by the baby. Rather infant responses to mother and nurse during feeding and changing were similar.

McInnes *et al* (2010) found that nurses made feeding decisions with limited parental involvement. They suggested that increased parental involvement in feeding choices was required for successful feeding. This was supported by Nyquist & Engvall (2009), who in a questionnaire study asked 43 parents and 85 nurses about caregiving activities. Their results showed that nurses and parents agree that parents are the infant's primary caregivers, although they added that the roles depended on individual ability and willingness to take on the task. In particular, nurses were seen as educators and supporters of the parents rather than caregivers of the baby.

Flacking *et al* (2006) in a qualitative study of 25 mothers with premature infants in seven Swedish NICUs indicated that 'becoming a mother' in this environment entailed social bonds established with the staff as well as the baby. In particular, breastfeeding support enhanced the confidence which mothers developed while feeding their infants. De Rouck & Leys (2009) reviewed the literature on maternal/paternal information needs in the NICU. They concluded that parents have extensive information needs taking the illness trajectory of the premature infant into account. This information need has to be met by health care professionals, especially nurses. Punthmatharith *et al* (2007) argued that providing nursing care to meet the needs of mothers may be unsuccessful because in general most nurses perceive and prioritise maternal needs differently from mothers. Additionally there is variation between mothers. Different mothers prioritise different needs with some mothers prioritising the maternal role, and others the medical treatment of the infants and yet others prioritising nursing care. Nurses need to be sensitive to these variations. This conclusion is supported by the in-depth interview analysis of Fenwick *et al* (2008) who suggest that in the NICU nurses need to reorient the delivery of their services from the infant to the mother-infant dyad.

Discussion

The emphasis of what is a successful feeding interaction has moved from medical aspects of feeding to psychological aspects of feeding. Furthermore, nurses who were previously seen as teachers are now perceived to be facilitators of the mother-infant dyad. However, in-depth studies comparing feeding interactions of mother and nurse with the premature infant are missing. The role of the nurse has changed from expert to service provider; nevertheless mothers inexperienced in taking care of the needs of a premature, often fragile, infant need to engage with the nurse in order to grow in their role and expertise.

What is missing and may help to explain the reason why, apparently, research evidence does not translate into practice is that the one comparative relationship that remains unexplored is the relationship between nurse/infant compared with the mother/infant during feeding interactions.

There are numerous studies which focus on instrumental clinical research, such as contents of milk nutritional levels, infant abilities such as the development of being able to suck from breast or bottle (Howe *et al* 2007, Sheppard & Fletcher 2007) or instruments used to facilitate feeding. A Cochrane review (Crowe *et al* 2012) on the topic examined feeding readiness instruments in terms of time taken for full oral feeding to be established and duration of hospitalisation. However, missing are comparative studies examining how infants react to mother versus nurse during feeding interactions from a developmental perspective. There is very little research on this topic even though it is essential for infant development and optimal nutritional attitude underlying normal feeding routines.

This paper has reviewed studies conducted on the NICU focusing on the psychology of feeding interactions, namely putting the mother at the centre of the feeding interaction specifically when she is breastfeeding and outcome measures, rather than the medical aspect of feeding in terms of types and timing of food given during the course of the development of premature infants on the NICU.

In conclusion, our review supports McGrath & Braescu (2004:363) who argued that 'the interaction among preterm infant, care provider, and environment during bottle feeding has been studied separately, but the dynamics of the entire holistic process remain unstudied' and hence a definition of 'successful feeding' needs a change in focus from the medical to a psychological perspective.

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The Lancet Series on Breastfeeding

Rosie Dodds

ORIGINAL

'The scaling up of breastfeeding to a near universal level could prevent 823,000 annual deaths in children younger than 5 years and 20,000 annual deaths from breast cancer' (Victora *et al* 2016:476).

This is the finding of the first part of *The Lancet Series*, which is a timely summary of the value of breastfeeding in reducing mortality and morbidity as well as addressing inequality globally (Victora *et al* 2016). In view of the economic and environmental costs of low breastfeeding rates and the ability of relatively low cost interventions to enable women to breastfeed for longer, it makes a convincing case for governments and civil society to improve investment in breastfeeding.

The first paper considers: health outcomes; potential lives saved; recent understanding of some of effects on immunity and the microbiome; and estimates trends in breastfeeding rates globally. The second examines factors that influence breastfeeding rates and the effectiveness of promotion interventions (Rollins *et al* 2016). The changing understanding of breastfeeding in HIV transmission, marketing of breastmilk substitutes (BMS), and environmental and economic aspects are also summarised. This leads to the deduction that, as 'potentially one of the top interventions for reducing under-5 mortality', breastfeeding has a substantial contribution to make to future global development (Victora *et al* 2016:487).

Health outcomes

In updating health outcomes related to infant feeding, Victora *et al* (2016) considered 28 systematic reviews and meta-analyses, of which 22 were commissioned for this review.

Mortality

Meta-analysis of studies in low- and middle-income countries (LMICs) found a strongly protective effect on mortality, with exclusively breastfed infants under six months having only 12% of the risk of death compared with those who were not breastfed. Any breastfeeding was associated with a 50% reduction in deaths among children aged 6-23 months. In high-income countries (HICs), breastfeeding was associated with a 36% reduction in sudden infant deaths and, for premature babies, 58% lower risk of necrotising enterocolitis.

The Lives Saved Tool was used to calculate the mortality associated with not breastfeeding in 75 LMICs in 2015. If breastfeeding was increased to near universal levels, this was equivalent to 13.8% of the deaths of children under two years of age; an estimated 823,000 child deaths. Considering only breast cancer mortality, 22,216 mothers' lives would be saved by increasing breastfeeding duration to 12

months per child in HICs and two years per child in LMICs every year.

Morbidity

Breastfeeding was associated with lower risks of infectious diseases, including gastroenteritis, respiratory infections and otitis media. Approximately half of diarrhoea episodes and a third of respiratory infections would be avoided by breastfeeding, with greater reductions in hospital admissions of 72% for diarrhoea and 57% for respiratory infections. Breastfeeding is also associated with a 19% lower risk of childhood leukaemia.

No clear evidence of protection against allergic disorders, including eczema or food allergies was detected, although there was some evidence of a reduction in allergic rhinitis in pre-school children. A statistically significant reduction in asthma of 9% was indicated with breastfeeding in analysis of 29 studies. However, this was not significant when analysis was limited to 16 studies with tighter control of confounding.

Oral health outcomes demonstrated a reduction of 68% in malocclusions with breastfeeding. In contrast, breastfeeding for longer than 12 months and nocturnal feeding were associated with 2-3 times more dental caries in deciduous teeth, which the authors note is possibly due to inadequate oral hygiene after feeds.

Most studies of links between breastfeeding and outcomes related to non-communicable diseases are from HICs. Longer periods of breastfeeding were associated with a 26% lower risk of overweight or obesity which was consistent across different income groups. Considering only large, high-quality studies reduced this to 13%. In line with this there was a 35% reduction in the incidence of type 2 diabetes, but high-quality studies indicated a potentially important, but not statistically significant, reduction of 24%. A review of six studies also found a possible



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